The Coyote Unmanned Aircraft System (UAS) is a small, airborne launched platform that was first developed in 2006-2008 by BAE through an SBIR with the United States NAVY. It is equipped with a meteorological and oceanographic (Metoc) payload similar to a dropwindonde currently deployed by research and operational aircraft to capture vertical atmospheric profiles in multiple mission scenarios as well as remote estimates of sea surface temperature. The Coyote is advancing the dropsonde system capability by increasing loiter time and data collection in the boundary layer of tropical cyclones and other poorly studied atmospheric phenomena. The Coyote technology and design is now owned exclusively by Raytheon who has partnered with NOAA to expand the capability to an operational observing tool that NOAA cannot live without. The boundary layer is the lowest layer of the atmosphere where hurricanes exchange momentum with the surface and extract heat and moisture from the ocean. This region of the storm has been identified in prior studies (e.g., Emanuel 1995; Cione et al. 2000; Cione and Uhlhorn 2003; Smith et al. 2009; Bryan and Rotunno 2009; Cione et al. 2013) to be of critical importance to hurricane intensification. Recent studies by Smith and Montgomery (2012) and Gopalakrishnan et al. (2013) have also shown a strong sensitivity to moisture conditions within the hurricane boundary layer. Despite the critical nature of this environment, routine collection of kinematic and thermodynamic observations remains elusive. Currently, temperature, moisture, and wind observations below 500 m within and surrounding the hurricane inner core are very limited since the primary source of data at these low altitudes are from point-source GPS dropsonde measurements. The lack of both thermodynamic and kinematic data coverage at low levels is a primary reason why hurricane boundary layer structure and associated physical processes within this critical region of the storm remain poorly represented in today’s operational models (Zhang et al. 2012). In turn, inadequate representation of physical processes within the boundary can lead to errors in initialization and data assimilation, which can ultimately impact the accuracy of subsequent forecasts. It is believed that an improved understanding of boundary layer processes, through targeted, enhanced observation will be essential in order to improve future predictions of hurricane structure and intensity.

In an effort to fill critical voids and provide unique, real-time data to NOAA's operational centers, multiple Coyotes were deployed into major hurricane Edouard (2014) using NOAA's manned P3 Hurricane Hunter aircraft. Over the next few years, testing of this potentially transformative emerging technology will continue, in the hopes of improving basic understanding and enhancing NOAA’s operational hurricane prediction system. During this time, investments will be made to advance the existing Coyote platform into

an operationally-feasible, economically-viable observing tool that can be routinely used by NOAA, US Air Force and other manned aircraft platforms to sample Hurricanes and other targetable atmospheric phenomenon